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## EDITORIAL

### EVENTUALLY, WHY NOT NOW?

CERTAIN interesting facts present themselves when we survey modern society as distinct from primitive society. Under original conditions, the weak were penalized in the struggle for existence: health and physical strength were encouraged. To-day the same struggle goes on, but intelligence has assumed more relative importance as a final arbiter between life and death: the intelligent survive and the less intelligent suffer various handicaps because of their deficiency.

If such were the whole story we might, as a race, look forward to steady evolution in the direction of increasing intelligence and physical perfection. But two additional factors complicate the picture. Modern philanthropy, grown to enormous proportions in recent years, subsidizes the incapable at the expense of the capable. And modern medicine, with ever-improving technic, is giving a new lease on life to the weak. Thus, we take care of the individual and recklessly ignore the race.

The question is, what are we going to do about it? For we may be quite sure that if we do not do something about it, natural processes will do something of their own accord. If this survival of the unfit goes on, the race will deteriorate until, perhaps, it will not be able to support and operate the complex machinery of modern society, with its philanthropy and compassion, and will lapse into a more primitive and fierce struggle for existence, in which the fit *will* survive. If we do not begin to reward virtue, nature will see that she is rewarded in a reversion to a more primitive struggle for existence.

But he who, in seeking a solution, counsels a policy of callous disregard for individual suffering in order to allow natural selection to operate, fails to consider social and emotional factors which make life endurable. We cannot turn back now and cease to keep the incapable from starving and the weakling from dying. To do so would rob life of some of its greatest emotional values.

But, if we must save these incompetents to life, must we perforce save them to the race? Though they live, need they beget children? While we may tenderly care for them, if we do not stop the multiplication of the unfit while burdening the fit to keep them alive, we will inevitably drag the race backward, victims of our own altruism.

Eventually, therefore, we *must* prevent the unfit from reproducing. Raw nature prevented their reproduction by letting them die. If we

are to thwart nature by letting them live, we must prevent their reproduction, or nature will crush humanity under a weight of unfitness. Society's greatest problem is not international peace, but international eugenics.

A critic may reply that we have no method of selecting the unfit, now that the struggle for existence is partially abrogated. True. There is little we can do as yet, but three measures may be mentioned which we *can* adopt, and should adopt now.

1. We can search out every possible "racial poison" and try to control it. Syphilis and alcoholism may be mentioned as possible examples. We are already doing more in this respect than in any other.

2. We can prevent the marriage or reproduction of the definitely feeble-minded and insane. In England an imbecile can undertake no contract except that of marriage.

3. We can give contraceptive measures to the so-called "lower classes" and serve both euthenic and eugenic ends. If the deficient reproduced less, the diligent and capable could afford to reproduce more.

At any rate, what we can do, we should do. And as time goes on we shall be enabled to do more. The reward for success is almost too great to be imagined, and the punishment for failure is too severe for contemplation.

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## THE ERA OF CHEMISTRY IN MEDICINE

MEDICINE is the father and mother of many sciences. Each one of these as it develops to maturity becomes for a while the chief support of its aged parent, and when it has reached its full stature, yields place to a more vigorous son. In this way, deriving support in turn from the various medical sciences, Medicine itself advances towards a more complete knowledge of mankind, his ailments, and their cure.

Thus for one glorious period Bacteriology has been the chief servant of Medicine, revolutionizing our conceptions of disease, resulting in a vast accession of knowledge, giving us the benefits of aseptic surgery, and through serology, a few specific cures. Pathology, also, has had its turn, but does not seem likely to have a great deal more of importance to teach us. Anatomy, too, seems to be almost a completed science. For the present at least these sciences must give way to Chemistry, Physiology and Psychology. The greatest of these is Chemistry; indeed the more other sciences contribute to the sum total of knowledge the more Medicine will come to lean upon Chemistry, for in Chemistry and the vague mysterious borderland between Physics and Chemistry must one day be found the ultimate of knowledge—perhaps even life itself.

Since the beginning, Medicine and Chemistry have advanced *pari passu*. The rapid development of Medicine in the past century is now being reflected in an equally rapid progression in Chemistry. Modern Medicine owes mainly to Chemistry such essentials as a knowledge of metabolism and nutrition, the quantitative examination of the blood and body fluids, the perfection of methods of toxicological analysis, the discovery of many histological stains, the examination of gastric

contents, the kidney and liver function tests, the boon of salvarsan, a greater knowledge of internal secretions, the isolation of insulin, the rational use of iodine in goitre, a true theory of the vomiting of pregnancy, the synthesis of many remedies, and since Chemistry is at the bottom of much of physiology, many great advances in this science must be credited in part to Chemistry.

What may we expect from this vigorous science in the near future? Probably a fuller knowledge of internal secretions, almost certainly the discovery of new specific remedies for disease, undoubtedly some new aids to diagnosis. He is a rash prophet who ventures further, and a gloomy one who cannot imagine more.

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## RENDER UNTO CAESAR THE THINGS WHICH ARE CAESAR'S

ALL too often, particularly in the history of literary, historical and scientific research, it seems to have been, if not the avowed, at least the practised policy of Dame Fortune to accord "honour where honour is *not* due." Any school boy knows that the discoverer of America was Christopher Columbus when, as a matter of fact, Columbus never got even within gunshot of America; never saw the continent; and his most far-reaching contribution to the old world may have been "the plague of civilization."

Again, our twentieth century dentists are, perhaps, justly proud of their skill in filling teeth with gold and silver and yet the good old Romans beat us to it by at least 2229 years for the Laws of the Twelve Tables, dating 304 B.C., were in part fulminated against vulgar ostentation in funerals, forbidding the use of gold and rich raiments in burial, yet naïvely granting "that gold need not be removed from the teeth of the corpse."

During the past century Dr. Long of Jeffersonville and Sir J. Y. Simpson of Edinburgh have been hailed as great benefactors of society for their discoveries in anaesthesia. But we have references to anaesthesia dating long before the Christian era, such as the mention by Homer of the effects of nepenthe and the reference in Herodotus to the practice of the Scythians of inhaling the vapours of hemp to produce intoxication, while the employment of anaesthetics in surgery, by the use of mandragora is particularly alluded to by Dioscorides and Pliny. As for abdominal surgery, it was the manner of entry into this world of one of Julius Caesar's ancestors which named for us our Caesarian section operation of to-day.

In another line we have Jenner in the year 1780 rediscovering the process of vaccination with cow pox virus to protect from smallpox, but one of the earliest known Hindu physicians, Dhanwantari, the Vedic father of Medicine, who lived about 1500 B.C., *i.e.*, 3280 years before Jenner, described vaccination against smallpox and even the method of obtaining the virus from the cow's udder.

How often one is driven to the conclusion that there is "nothing new under the sun!"

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# DIAGNOSIS AND TREATMENT OF CARCINOMA OF STOMACH

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Carcinoma of the stomach is an extremely common condition, the stomach being the third most common site of cancer generally. The breast, cervix and stomach are the three predominating situations in which malignant disease occurs.

In the past five years, of 2,218 cases of cancer treated in the General Hospital, 226 originated in the stomach. It has been estimated that 1% of all deaths are due to cancer of the stomach. The disease is invariably fatal in from one to three years, except in those cases in which an early excision has been possible. The early diagnosis of the disease is manifestly a problem upon which the hope of success depends.

The symptomatology of gastric cancer is exceedingly variable and elusive. This variation probably depends on the nature of the growth, but more particularly on the situation in which it occurs. The greatest care and patience are necessary in obtaining the history from the patient, and it is on the information gained by careful questioning that the early diagnosis depends. The history is the important part of the problem.

The symptoms vary chiefly with the position of the growth, and it is convenient to classify the cases into four groups as follows:

1. Those in which the growth obstructs the cardiac orifice.
2. Cases in which there is early pyloric stenosis.
3. The cases in which the growth occurs on the lesser curvature or in the body of the stomach without producing stenosis.
4. The rather rare group of cases in which the earliest symptoms are due to metastases.

## 1. *Carcinoma Obstructing the Cardiac Orifice.*

These cases would appear to be relatively rare, occurring in only 3% of the series examined. The symptoms, insidious in origin, early present signs of low oesophageal obstruction, with pain immediately after food, often lasting all day. Early in the condition there is a regurgitation of gastric contents with a burning, bitter taste in the mouth. As the obstruction becomes more marked, vomiting is persistent, and the taking of solids impossible. X-Ray examination will demonstrate oesophageal delay and a filling defect in the cardia.

## 2. *Carcinoma Obstructing the Pylorus.*

This type occurred in 10% of the series. The symptoms in these cases are not due to Carcinoma, but to the obstruction produced. The history will be relatively short, usually a few months, and will reveal early the presence of pyloric obstruction. There is constant pain, colicky

in type, worse after each meal, and usually worse at the end of the day. There is vomiting of large quantities of material, and in the vomitus particles of food taken some time previously may be recognized. Vomiting gives complete relief. The appetite is diminished, or may be absent. There is an early and marked loss of weight. On examination a distended stomach, or visible peristalsis may be seen. X-Ray examination will show a delayed emptying of the stomach and an irregularity in outline at the pylorus.

It is important to remember that pyloric obstruction of short duration occurring in an individual over 40 years of age, previously free from gastric symptoms, is almost certainly Carcinoma.

3. *Carcinoma on the Lesser Curvature or Body of the Stomach, and not Obstructing the Orifices.*

The vast majority of gastric cancers fall into this group, constituting 80% of the series. Clinically they may be classified into three great groups:

1. Those of sudden onset:

   (a) Sudden abdominal pain may be the first sign of the disease, and this occurred in 3% of the cases. The sudden onset of pain after a heavy meal. The pain is colicky in nature and made worse by taking food.

   (b) Sudden severe haematemesis may be the first evidence of the disease. This is unusual and is said to occur in about 1% of cases.

   (c) Perforation of the stomach, suddenly occurring, with no previous history of disease, occurs in less than 1% of cases, and may be recognized by the general signs of peritonitis.

2. Carcinoma of insidious onset.

   Of all varieties of gastric cancer this seems to be the most common and occurred in 60% of the present series.

   Although ill defined, the earliest symptoms are extremely important and suggestive. At first there may be no symptoms referable to the stomach. A general weakness, a feeling of being "out of sorts," a lack of energy, an inability to do work or to concentrate, are the usual signs. There may or may not be any loss of weight. One very important early symptom is a change in appetite, varying from a "going off" one's food to a positive distaste for food. Gastric symptoms such as discomfort or mild pain after food gradually appear, these, however, may be ill-defined and only elicited on close questioning. The discomfort or sense of fullness is persistent throughout the day, made worse by taking food, and it is continuous from day to day. Vomiting may be entirely absent, more commonly there is a regurgitation of bitter material,

often described as "water brash." Later pain may become a definite symptom, and vomiting and gastric distension persistent. Vomiting when it appears gives only temporary relief. A slow progressive wasting, an increasing weakness and anaemia occur. In this stage the X-Ray will give unmistakeable evidence of the disease.

If the significance of these early signs of carcinoma are overlooked much valuable time may be lost in medical treatment, and the chance of successful operation lost.

3. Group of cases with the history of a long gastric disability.

In a short series of 32 cases coming to autopsy, six belong to this class. In these cases there was a previous history of indigestion, presenting a definite periodicity and lasting several years.

Attacks of pain or discomfort after food with long intervals of freedom from symptoms was the usual history. The appetite had always been excellent. Vomiting, when it occurred, gave relief. In some cases they had vomited blood.

A change now takes place in the symptomatology. The attacks of pain or discomfort lose their periodicity and become continuous, from day to day. The distress, though continuous, is not so severe, a constant mild pain from day to day, lasting all day. The nature of the pain has changed. It is a dull ache, a constant sense of discomfort. The most significant change is a loss of appetite. Vomiting, if present, no longer gives relief, or gives only temporary relief. Wasting is a late complication and depends on serious interference with the function of the stomach, loss of appetite, and the secondary infection of the growth. A marked and progressive secondary anaemia manifests itself.

4. *Cases in which Early Symptoms are due to Metastases.*

The first evidence of Cancer of the stomach may be due to secondary growth in bone. We have had two cases in the last three years in which pain in the back, associated with rigidity of the spine and atrophy of muscle were the first signs of the disease. Actually these two cases were considered to be spinal tuberculosis, and the true diagnosis was made at autopsy which revealed a carcinoma of the stomach with secondaries in bodies of the vertebrae. While these cases are rare, they must be constantly looked for as an explanation of obscure pains in the back or limbs.

*Treatment of Carcinoma of the Stomach.*

The treatment of gastric cancer is a surgical problem. The operative treatment is radical, or palliative.

1. *The Radical Cure of Gastric Cancer.*

A partial gastrectomy, with a removal of the regional lymphatic glands, offers the only hope of permanent cure. This operation may be done in one or two stages, depending upon the condition of the patient. If done in two stages there is always the danger that the growth may have extended rapidly, rendering the completion of the operation impossible.

2. *Palliative Treatment.*

(a) A partial gastrectomy may be justified, even in the presence of secondaries in the liver, as by this means life may be prolonged and made more comfortable.

(b) A gastro-enterostomy, to relieve pyloric stenosis, may be done, and this is usually an anterior one.

(c) A gastrostomy may give relief in obstruction of the cardia.

The small carcinomas of the pylorus, or on the lesser curvature, are alone amenable to resection. Success will depend on early recognition of the condition, and a wide excision of the growth.

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## HYDROPIC DEGENERATION OF THE ISLANDS OF LANGERHANS

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(From a paper presented at the Physiological Journal Club, December 8, 1924)

Although a possible association between pancreatic lesions and diabetes had been considered over two centuries ago, it remained for Minkowski and Von Mering, in 1889, to submit the first definite proof of this relationship. Where others had previously failed, they succeeded in completely removing the pancreas of a dog with the exceedingly important result that a rapidly fatal diabetes developed within 24 hours after the operation.

Partial pancreatectomy, consisting of removal of approximately seven-eighths of the gland, resulting in quite definite, but less severe symptoms of diabetes has been used by F. M. Allen, Homans, and others in the study of the disease, and their researches have led to a much better understanding of diabetic pathology. Homans has stated that until one is familiar with the progressive changes in the pancreas in cases of diabetes, one can not recognize them in anything short of their terminal form.

One of the changes noted in the cells of the islands associated with active diabetes is known as hydropic degeneration. It was first described by Weichselbaum in 1900 in human cases and later was found by Allen and Homans, working independently, in diabetic dogs. In 1914 Homans showed that the degeneration was limited to the beta cells of the islands,

while the alpha cells remained apparently unchanged. The degeneration consists of a thinning out of the secretory granules, followed by an accumulation of fluid within the cells. This fluid, which is not fixed or stained by any known method and which appears as a vacuolation in stained sections is probably watery in nature, as results are quite negative after applying the special methods of technic for demonstrating fat, glycogen, hyalin, colloid or amyloid. By its absorption and accumulation in the cells, they become swollen and finally break down and disappear without leaving any sign of inflammatory reaction or replacement fibrosis, so that there is no visible evidence remaining to show that the number of cells in the island has been reduced. Allen found that the stage which exhibits maximal vacuolation may persist for about a week before the actual breakdown of the cells, in cases of severe uncontrolled diabetes in dogs. During the later stages of the degeneration the nucleus becomes dense and pyknotic.

It is now considered that it has been sufficiently proven, particularly since the discovery of insulin and its extraction in large yields from the isolated island tissue of fishes, that diabetes may be defined as being a deficiency of the internal secretion of the islands of Langerhans. The demonstration of the nature of hydropic degeneration affords an explanation of this deficiency. Hyperglycaemia and glycosuria are not included in the definition as these are merely symptoms of the disease.

Hydropic degeneration is said to be a specific lesion of diabetes, as vacuolation of a similar nature has not been noted in other tissues of the body or in the pancreas of non-diabetics. It is independent of the process of digestion and also of the concentration of sugar in the blood since a state of diabetic hyperglycaemia can, by the administration of phloridzin, be replaced by one of hypoglycaemia without this leading to any change in the progress of the degeneration.

After experimenting with pancreatic grafts, separated from their original nerve supply, Allen concluded that the stimulation that leads to exhaustion and degeneration of the beta cells comes from the circulating fluids of the body and that nervous influences, which are known to exist in diabetes, must be considered as aggravations that are of minor importance.

The most important finding was that the degree of the degeneration usually runs parallel to the severity of the diabetes and that when the disease is controlled the hydropic changes are also abated. This was proven experimentally by partially depancreatizing a dog so that it was mildly diabetic on a meat diet and then adding sufficient carbohydrate to the food to bring about a severe form of the disease. After a few weeks of such feeding a small portion of the remnant of the pancreas was removed and microscopic examination demonstrated marked vacuolation of the island cells. The carbohydrate was then withheld from the food, with a resulting reduction of the diabetic symptoms and tissue removed a few weeks later showed that there was recuperation in cells that formerly must have been vacuolated. It was shown, however, by sugar tolerance tests that even after the return to original meat diet there was a noticeable permanent increase in the severity of the symptoms and the assumption was that for the loss of some of the island cells through hydropic degeneration during the period of severe diabetes, there was a corresponding increase in the severity of the disease.

This important conclusion meant that in order to find the primary cause of diabetes, one must consider any or all factors that might lead to a reduction in the number of functioning island cells and the consequent deficiency in their secretion.

Opie, in 1900, found that in a majority of cases of human diabetes there were sufficient sclerotic changes to account for much destruction or damage of island tissue. He described two kinds of pancreatitis, an interlobular type and an interacinar or diffuse type. In the former which was much more common, the fibrous changes begin at the periphery of the lobule and since the islands are usually in the central part they are not affected until the pancreatitis has been present for a considerable time, a fact which explains how a disease of the pancreas that may have had its origin many years previously, eventually may bring about such a damage of island tissue that diabetes finally develops. This type of pancreatitis may be produced by duct obstruction, by ascending duct infections, and by infections through the lymphatics and blood vessels. Selman and his collaborators conclude that most of these cases are due to previous attacks of blood-borne infections, such as the acute infectious fevers. Allen has stated that without pancreatitis there can be no diabetes and challenges pathologists to produce exceptions.

It has been shown experimentally (Allen) that an acute inflammation, affecting both acinar tissue and islands, may subside and leave little trace of its former existence except damage to island cells, sufficient to cause diabetes. The very slight traces left of the previous inflammation were, as Barron puts it, just enough to indicate that a "storm had passed over the islands."

There is clinical evidence that one-fourth of the human pancreas is enough to prevent diabetes, though there is always a lowering of sugar tolerance after reduction in the amount of pancreas. There is, therefore, a large margin of safety in a normal pancreas.

Homans states that activity, exhaustion and degeneration is the cycle of events in hydropic degeneration and Allen points out that we have here a unique example of anatomic breakdown of an endocrine organ under functional overstrain. There are some who differ with this conception of the lesion and Conroy considers that its significance has yet to be determined.

Carbohydrate diet never leads to diabetes in a dog with a normal pancreas but it aggravates an existing disease by increasing the functional overstrain on the island cells.

In experimental dogs it requires four or five days of severe diabetes before hydropic changes are apparent. Maximal vacuolation of practically all the beta cells is present after about three weeks or one month. They may remain in this condition of extreme vacuolation for about a week before disintegration takes place. At the end of six weeks or two months practically all the beta cells have disappeared, only the alpha cells being left.

That the hydropic changes are reversible if checked in time has been shown, first by the regulation of the diet, and since then by the use of insulin. Copp and Barclay (1923) have found that insulin given to dogs having marked hydropic degeneration, allows the island cells to return to their normal condition of granulation, recovery taking place in about two weeks. They concluded that the island cells do not take up and store any of the injected insulin in the form of granules and that

the restored cells must produce their own secretion of insulin in the natural way.

The importance of the demonstration of the nature of the hydropic change has been summarized by Allen (1922) as follows:

1. Its presence affords a positive microscopic diagnosis of active diabetes.
2. It completes the proof of the island theory of diabetes.*
3. It adds to the evidence of the essential identity of experimental and clinical diabetes.
4. It explains the permanent lowering of assimilation in diabetes consequent upon excessive diets.

He also submits evidence to show that after the complete exhaustion of the beta cells there is still an unknown internal secretion of the pancreas, possibly from the alpha cells, which is somehow important for the welfare of the organism. Longevity experiments now being carried on in Prof. Macleod's laboratory tend to confirm the theory of the existence of such an unknown secretion.

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# JAUNDICE

## FIRST PAPER: NORMAL AND PATHOLOGIC PHYSIOLOGY

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(Condensed from a paper read before the Alpha Omega Alpha Fraternity on January 12, 1925.)

Jaundice, according to a definition given by Osler, is a "condition characterized by coloration of the skin, mucous membranes, and fluids of the body by bile pigment." However, in discussing the subject, one is led into a more recondite examination of bile pigment metabolism. Modern work in this field has diverted our attention from the more obvious colour of the skin to a study of the pigmentary constituents of the blood. Our field will be, therefore, a consideration of the general phenomenon of increased bilirubin content of the blood, which may be appropriately named *hyperbilirubinemia*.

Hemoglobin is known to be the normal source of bile pigment. Whether any other substance may also go to form bilirubin can not be stated. But though it has been easy to demonstrate that hemoglobin is the mother substance for bilirubin, the site of this transformation has long been sought, and only recently have we had conclusive evidence as to its location.

*The subsequent extraction by Macleod of insulin in large yields from isolated fish islands affords the most direct proof of this theory.

Perhaps it was natural to charge the liver with the responsibility for the formation of bile pigment, since the bile capillaries lie in such close association with the polygonal cells of the liver. But in 1847 Virchow[1] found hematoidin in old blood extravasations, quite inaccessible to the liver, and hence concluded that bilirubin, which he considered identical with hematoidin, could be formed without the liver. Thus, we had the early development of the idea of hemolytic, or extra-hepatic jaundice. Until recently the battle has waged back and forth, first one investigator contending that all jaundice must be hepatogenous, and then another contending that the liver is not essential. The leaders in this long controversy were Minkowski and Naunyn, Eppinger, McNee, and others.[1] Most of the attempts had to do with the removal of the liver in birds, together with great hemolysis at the same time, the birds being watched to see if jaundice developed under such conditions. Such birds lived usually only six hours, and did not show any marked jaundice that could not be attributed to defects in technic.

By some, the clinical cases of so-called hemolytic jaundice were explained by a supposed damage to the liver cells, so that they, after forming bile pigment, secreted it into the blood stream instead of into the bile ducts.

But Whipple and Hooper[5] in 1913, by using the Eck fistula and by tying off all circulation below the diaphragm, leaving only a "head-thorax" circulation, did get jaundice in dogs. Their work was severely criticized, but was confirmed in 1924 by Mann and McGath[9, 10] at the Mayo Clinic, who successfully extirpated the liver in the dog, maintaining life for over twenty-four hours. Such dogs did show jaundice. Thus it was finally demonstrated that jaundice *could* be extra-hepatic in origin.

The question now arose as to where such extra-hepatic bile pigment was formed. By the brilliant work of McNee, a Scot,[2], and Aschoff[13] (of Aschoff-body fame), attention was directed to the *reticulo-endothelial system*. McNee found Kupffer cells of the liver, which make up a part of this system, loaded very heavily with broken red cells and hemoglobin in cases of birds given a hemolytic poison. Aschoff, following the work of Ribbert[13], stained the cells of the reticulo-endothelial system with such vital stains as trypan-blue, carmine dye, etc., and taught us much concerning their structure, location and function.

These reticulo-endothelial cells are distributed in widely scattered parts of the body. The Kupffer cells of the liver, similar large endothelial cells of the spleen, and large mononuclear cells, lying in the interstices of almost all the connective tissue of the body, in all lymphatic tissue, in the capillaries of the adrenals and the sinuses of the hypophysis, belong to this system. The familiar large mononuclear cells, or endothelial cells, of the blood are reticulo-endothelial cells which have wandered into the blood stream. These cells have the peculiar property of phagocyting not only formed objects, such as bacteria, red cells, etc., but also *dissolved* substances, such as the dyes used to stain them, and hemoglobin.

Cells of the reticulo-endothelial system have been much studied lately. So far as their function in forming bilirubin from hemoglobin goes (which is only one of their functions), the most conclusive work was done by Rich of Johns Hopkins,[8] who cultured them *in vitro*, and

adding hemoglobin to the culture, watched the formation of bilirubin under the microscope. However, full credit should be given to McNee, working in England, who was one of the pioneers in the work, and who pointed the way over twelve years ago.

Thus it was established that bilirubin was formed not in the polygonal cells of the liver, but in the cells of the reticulo-endothelial system. The Kupffer cells of the liver being such a prominent part of this system, removal of the liver greatly reduces the rate of development of jaundice in birds suffering from heavy hemolysis. These investigators, together with others, whose work can not be described here, showed that red cells, when they are worn out, are engulfed by the reticulo-endothelial cells, their hemoglobin broken up and bilirubin formed, and the pigment then released into the blood stream.

This bilirubin, as it is released into the blood, is not, however, exactly the same as that which is found in the bile passages. The two forms of bilirubin give different reactions by the van den Bergh test, which will be more fully described and discussed in the second paper of this series. The bilirubin of the blood is less easily oxidized to biliverdin than is that found in the gall bladder. And finally, blood bilirubin is not excreted by the kidney at all as such (being excreted rather as urobilin), while the bilirubin of the bile passages, if re-absorbed into the blood, is instantly excreted as bilirubin. The change in the bilirubin which is responsible for these differences must be effected by the only structure intervening between the blood and the bile passages, viz., the polygonal cells of the liver. Thus, bilirubin as it is formed in the reticulo-endothelial cells, is taken up by the polygonal cells of the liver, and excreted into the bile passages in its final form.

Once the bile pigments are poured into the duodenum they are reduced to stercobilin by the action of bacteria. Stercobilin gives in part the characteristic colour to the feces. The bilirubin normally present in the blood, before being handled by the polygonal cells of the liver, is partially excreted as urobilin by the kidneys. Such amounts of urobilin as normally appear in the urine are, however, not detectable by ordinary tests.

With, then, this picture of the normal physiology of the bile pigments, as demonstrated by the most recent work in the field, let us consider the possible points where a disturbance may produce jaundice. A complete classification of all the conditions giving hyperbilirubinemia or jaundice will appear in the second article of the series. Here we will consider the pathologic physiology of the three main types of jaundice.

### I. *Obstructive Hepatic Jaundice*

With obstruction to the outflow of bile, the pressure in the bile ducts rises. When this pressure rises to a certain point the bile begins to be absorbed into the blood stream. It was formerly held that bile was reabsorbed by the lymphatics, but Lepehne,[1] by ligating the common bile duct in the dog, and opening the thoracic duct in the neck, got early and marked jaundice, but no bile pigment was obtained from the thoracic duct. Thus it seems demonstrated that in obstructive jaundice, absorption is into the blood directly. As a result of this absorption we find hyperbilirubinemia followed by the deposition of the bilirubin in all the tissues of the body. The jaundice here is spoken of as being

complete, since *all* the constituents of the bile are retained, both pigments and salts. The re-absorbed bilirubin is excreted by the kidney, giving a condition of choluria. There is no bile left in the intestine, so that we have fat indigestion and a failure to absorb fats. As a result, the stool will be clay-like.

### II. *Toxic and Infective Hepatic Jaundice*

In this type of jaundice we have a damage by toxin or infection to the polygonal cells of the liver. It is the most common type of jaundice. Remembering the physiology as described above, we can see that such damage will result in the accumulation of "blood-bilirubin" in the blood, since the damaged polygonal cells of the liver can not excrete it in sufficient quantities. Toxic damage to the liver may also be accompanied by increased hemolysis, due to the toxin. But liver damage may be so great that even normal blood destruction may furnish too much bilirubin for the liver to excrete. As a result, we have hyperbilirubinemia, followed by jaundice. As an almost inevitable accompaniment of this toxic damage to the liver, we have oedema and swelling of the liver cells, and the bile which is secreted is thick and mucoid, so that the bile canaliculi are obstructed, both from the oedema and from the thick bile. Thus we have true toxic hepatic jaundice combined with obstructive in almost every case. As a result of the obstruction, such bile as may have been secreted by the polygonal cells of the liver is largely re-absorbed, just as it is in ordinary obstructive jaundice. The blood, therefore, contains bilirubin which has never passed through the liver cells, together with pigment which has been re-absorbed. The van den Bergh test, applied here, will naturally give reactions characteristic of both "blood-bilirubin" and "gall bladder bilirubin" (*i.e.*, both indirect and direct). Such a van den Bergh is called biphasic.

The jaundice which results may be "dissociated," the liver damage being such that one constituent of the bile is retained more than another. Thus pigment may be piled up in the blood, but salts fairly well eliminated. Unless the associated obstruction is complete the feces will show the presence of stercobilin, and bile pigment will be present in the urine only in proportion to the re-absorption of gall bladder bile, which alone is excreted by the kidney as bilirubin. It is possible to conceive of a purely toxic or infective hepatic jaundice, *i.e.*, one not associated with any obstruction, but practically, it very rarely occurs.

### III. *Hemolytic Jaundice*

In this condition we have an excessive destruction of red cells, with a resulting production of excessive amounts of bilirubin. This might occur (1) by some hemolytic toxin, acting to destroy too many cells, or (2) by overactivity of the reticulo-endothelial system, destroying healthy red cells in addition to effete ones. With increased blood destruction, from whatever cause, we get increased amounts of bilirubin formed. So long as the liver cells can excrete all brought to them by the blood, the hyperbilirubinemia will be slight, and jaundice not marked. But the moment the power of the liver to excrete bile is exceeded the bilirubin content of the blood will become excessive, and jaundice more marked. If the toxin which destroys the red cells also damages the liver cells, as is very often the case, the tendency to jaundice will be greater.

The van den Bergh here will be "indirect" since the bilirubin in the serum has not passed through the liver cells. The jaundice, in addition, will be dissociated since no disturbance of any bile constituent except the pigment will be present. Salts will not be retained; hence bradycardia and pruritus, which are due to the retained salts, will be absent.

The bile in the blood is unchanged by the liver cells; as a result, it will not be excreted by the kidney. This is a condition of *acholuria*, always present in hemolytic jaundice, and giving it the name of acholuric jaundice. Bile is passed into the intestine; therefore, the excreta will contain stercobilin, and there will not be fat indigestion. If hemolysis is very rapid, hemoglobinuria may be present, hemoglobin being excreted by the kidney before it can be changed to bilirubin by the reticuloendothelial system. The urobilin of the urine, formed from unchanged bilirubin, will be increased, and the urine will be highly coloured as a result.

(The second and final article of this series on Jaundice, discussing clincial types of jaundice, will appear in the April issue of the JOURNAL).

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# A TALK TO SENIOR MEDICAL STUDENTS

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It is, indeed, a great privilege to be invited to make a contribution to the publication of an Undergraduates' Medical Society, and it is assuming a serious responsibility to undertake such a task. Twenty years' experience in the practice of medicine, six years of that period having been spent as the Superintendent of one of our great Canadian Hospitals, with a visiting list of over ninety Doctors, makes one feel that he may be in a position to give some helpful advice to students about to enter on the practice of medicine.

At the outset, I may say that there are two pieces of advice I could give to you, as senior students. In the first place, I would counsel you to get as broad a practical training as you can in the Disease of the Eye, Ear, Nose and Throat, before you begin practising. Such a training would prove invaluable to you, as general practitioners; it would increase your field of usefulness and would prove a substantial gain to your community.

Next, I would remind you that the most substantial foundation in clinical medicine is not laid altogether amid the glamour of a great hospital; a period of time spent with a studious general practitioner after graduation may easily be more profitable than a period of the same length spent as a hospital intern. It is only in general practice that you will come face to face, every day, with disease in its early stages. The study of ill health at its threshold is just now, for the first time, being seriously undertaken, thanks to the teachings of one of the greatest minds in the medical world, Sir James McKenzie, the tragic news of whose death reached us so recently.

I sincerely hope that, in your Medical Society, you are conducting debates on medical topics and I would implore each one of you to take an active part in their discussion. Bacon wrote, "Reading maketh a full man, conference a ready man and writing an exact man." As students you have had some opportunity for reading and it is, also, of the very greatest importance that you have conference with your fellow students by entering into the discussion of medical subjects in your Society. Mental development comes only through self-expression. Therefore, as students, you should lose no opportunity to express yourselves by taking part in discussion, as well as by writing.

Edinburgh graduates are pre-eminently fluent lecturers, probably the most excellent teachers of Medicine in the world. This quality in them has been credited to the active part they take in the discussion in the Royal Medical Society debates, as undergraduates. There is a great field here in Canada for the development of fluent lecturers and teachers in the domain of Medical Science. Read "How to Speak Effectively Without Notes," by Robert E. Speer. It is, of course, very important that you should read as much as possible on the subject to be discussed before coming to the meetings of your Society. Otherwise, as Dr. Robert Hutchison has said, "Your debates will be as sound and fury, signifying nothing."

It is important, when you first enter practice, that you begin to keep records of your cases. That is the only method by which you can intelligently keep in touch with the progress of your patients' illnesses. Otherwise you will soon forget the important details. Sir William Osler once stated that "notes, however brief, collected through long years, are the sole means whereby a man gets his experience codified and really helpful."

Develop, also, the habit of post-graduate study. The habit of reading, once acquired, will never be given up. What shall you read as young practitioners? I would advise you not to depend too much on the medical journals. They really present medicine only in the making and the young man is too apt to go after new gods, as it is. Books represent the more permanent things in medicine. Medical journals, like newspapers, debauch the mind, to a certain extent, and break its power to concentrate on any one line of thought. However, do some reading of journals. Take the *"Canadian Medical Association Journal"* and, just as soon as you can afford to do so, join the British Medical Association, which costs only between seven and eight dollars per year, and you will receive every week their *"Journal,"* which represents the most profound current scholarship in medicine.

As regards books, do not be in a hurry to purchase a large system of medicine or of surgery. Purchase and read "An Index of General Practice," by Dr. A. Campbell Stark. It contains a list of books suitable for a general practitioner. If you purchase the books he recommends you will have a valuable medical library at moderate cost. Read, also, Lord Riddell's book, "Some Things That Matter." You cannot afford to be without Dr. Cathell's book, "The Physician, Himself." It is replete with wisdom and will save you many an error.

I would not advise you to go abroad for a long period of post-graduate study. Dr. Richard Cabot once said that most physicians who have gone, in the past, to Germany and Vienna for graduate study, wasted their time. I believe he expressed a truth.

I cannot agree with the advice given by Sir William Osler, that the physician should leave wife and babes and go back to the hospital for graduate study. I could not go far away from my babes, at any rate. If the young physician knows how and what to read, he has no better place to advance than in his own practice. It is the only place he will be able to study disease in its early stage. He will never get this opportunity in teaching hospitals.

Do not be in a hurry to specialize in any department of medical science, as it is well that you should first have a broad training and experience in general clinical medicine. The late Sir William Macewen, Professor of Surgery in the University of Glasgow, once said, "No one can be a good surgeon unless he is first a good physician," and John Thomson, of Edinburgh, one of the most eminent authorities anywhere on children, has written that the entrance to Pediatrics, as a specialty, must ever be through the broad field of Clinical Medicine. A doctor who has taken to Pediatrics as a specialty early and before he has had a good training and experience in general medicine will be handicapped always. Sir James MacKenzie laid the foundation of his great work in general practice. He always discouraged specialism. He stated that

"the specialist begins his contribution to medicine after the disease has damaged the body and has provided a physical sign. The question arises, how was the physical sign produced? This simple matter is the essence of medicine. The specialist's attitude towards disease is not helpful towards this end. He does not help to find out the disease before it has produced damage. It is this limitation of outlook which retards the progress of medicine."

A too-ready appeal to such scientific methods of investigation as radiography and the clinical laboratory will do much to destroy the initiative in a young physician to think for himself. There is some danger of clinical observation not being developed in a physician who seeks much aid from laboratory methods. I am sure there is abroad in our profession a lack of appreciation of the value of that wisdom which can only be obtained by personal observation and experience.

In 1924 the President of the British Medical Association stated, in his annual address, that he would "urge those of the younger generation to think more and observe more for themselves, as their forefathers did, and not to be so ready to bow the knee in a fanatical worship of so-called scientific methods of observation and treatment." An enquiring mind, a doubting mind, an investigating mind is a precious gift. If you have such a thing in your possession, hold on to it. If you have not such a mind, try to develop one.

And, finally, when you settle in practice, do not hesitate to report cases and to write papers. "The pearls of thought should never on the mental pathway lie." Join the local Society and take part in its discussion. I am sure you will get more help in this way than by continually listening to lectures by other men, although they have their place. Mental development, however, comes only from self-expression. "Every man must grow his plot of wheat on his own ground and the soil is his own soul."

> "But, friends,
> Truth is within ourselves; it takes no rise
> From outward things; whate'er you may believe.
> There is an inmost centre in us all,
> Where truth abides in fullness; and around,
> Wall upon wall, the gross flesh hems it in,
> This perfect, clear perception—which is truth."

As a last word, I would advise you to know, also, something about mental diseases. Your alma mater is doing its very best to give you a training second to no other school. It is the desire of the University of Toronto to provide ample graduate instruction in its Medical Faculty. May I state my conviction that there are two departments that are not yet receiving sufficient attention, viz., the department of Psychological Medicine and the department of Operative Surgery? General practitioners ought to be able to go to the University from time to time and to receive practical instruction in surgical technique, so that they will be able to perform some, at least, of the emergency surgical operations met with in their practice. There is no reason why the doctor should not aim to be as well educated as the barrister, as devoted as the parson and as well paid as the publican.

# HEREDITY AND EUGENICS

J. H. D. SMITH, '30.

(Condensed from an article by R. Ruggles Gates, Ph.D., F.L.S., Professor of Botany in University of London; Head of Department of Botany at King's College)

Heredity and especially certain peculiar forms of heredity have for many years been the subject of particular study by scientists. Certain definite laws governing propagation have resulted, mainly from the theories advanced by Gregor Mendel. The principle, *i.e.*, Mendelism, which he set down deals with the inheritance of unit characters and states that the offspring of organisms with a pair of contrasting characters will be produced in a definite ratio. Mendel's studies of single characters in garden peas practically originated the scientific investigation of heredity. While he published his findings in 1854, it was not until 1900 that they came to light. The rediscovery of Mendel's principle of segregation in 1900 marked the beginning of an era in the study of heredity.

The number of characters in man which are now known to follow a Mendelian type of inheritance is surprisingly large. Of these, brachydactyly or short fingers, the digits having two joints instead of three, is an especially good example. This condition is dominant to the normal, which is said to be recessive. Brachydactylous individuals usually marry normals so that the offspring are the children of one normal and one abnormal parent. They are then said to be hybrid or heterozygous in nature as regards this character. The essential feature of Mendelian behaviour is that the factors or determiners for such a pair of characters as normal and brachydactylous fingers separate in the formation of the germ cells, so that half the germ cells of a brachydactylous person who had one normal parent will carry the factor for brachydactyly and half will carry the factor for normal fingers. If such a person marries a normal individual, all of whose germ cells are therefore carrying the factor for normal fingers, half the children on the average will be brachydactylous and half normal since the chances for the germ cells mating—(1) normal $\times$ normal and (2) normal $\times$ brachydactyl—are equal. From this it is seen that as long as matings of brachydactyls with normals continue, half the children will, on the average, be heterozygous brachydactyls while the other half will be pure normal. But if two heterozygous brachydactyls unite the offspring will be in the ratio of 3 to 1 for brachydactyly, the germ cells of each parent being 50 per cent. normal and 50 per cent. brachydactylous.

If a homozygous (pure for some trait) individual married a heterozygous individual the normal condition would be entirely suppressed and would continue to be so unless a chance union of two heterozygous individuals took place when there would be one chance in four of the recessive character appearing. This chance union is usually the reason that a reversion or throw back in a pedigree strain of animals sometimes occurs. A recessive character may thus be carried in the germ plasm of a strain for many generations, only to crop out again when a chance mating of two heterozygous individuals takes place.

The segregation which takes place in germ-cell formation can now be referred to definite elements in the cells, the chromosomes. These are the elements of the nucleus whose constancy in number and shape for each species of animal and plant is one of the remarkable features of organic structure. In the complicated process of mitotic nuclear division, which happens whenever cells divide in the growth and development of the organism, the essential fact is that they are split lengthwise, so that each daughter cell contains in its nucleus the longitudinal halves of every chromosome. Although these bodies seem to merge in the resting nucleus into a mass in which the outlines of the separate chromosomes are lost, yet there are cases in which the outlines can still be traced, each chromosome forming a separate compartment or vesicle of the nucleus. There is also evidence that the parts of the various chromosomes maintain their special relationships throughout the period between one division and another even when visible boundaries are lost, or, at any rate, that they reassemble with the same arrangement as they disappeared. There is something, not at present understood, which maintains the unity of the chromosome as a persisting structure, and determines the constancy of its relative size and shape during mitosis in the various parts of the organism.

The organism begins its development from the union of the nuclei of egg and sperm. When this union takes place it is not a mere intermingling of two fluid substances, for the chromosomes, which are highly viscous in the condensed condition, maintain their separate identity, and in the subsequent nuclear divisions they frequently arrange themselves in pairs, each pair consisting of one chromosome of paternal origin and one of maternal origin. In many animals and plants the various pairs are distinguishable from each other in size or shape. The chromosomes may therefore be said to possess individuality and to show genetic continuity from generation to generation.

When the germ cells of an organism undergo maturation as the organism develops, the chromosome number in them is reduced to one-half. The essential feature of this complicated process is the separation of the pairs of chromosomes which are characteristic of the somatic nuclei, so that the nuclei of the eggs and sperms receive one member of each pair and hence have half as many chromosomes as the somatic cells. Half the germ cells will thus receive one member of each pair, and half the other. In the separation of pairs in the reduction divisions there is free assortment of the chromosomes. There are many reasons for believing that the chromosomes are the basis of Mendelian inheritance, and that the segregation of characters, which Mendel's experiment indicated took place in the formation of the germ cells, really depends on the separation of the chromosome pairs in the reduction division. That segregation of factors really takes place during mitosis has been shown by the formation of two types of pollen grain in certain hybrid rice plants. In these first generation hybrids half the pollen grains contain starch grains, like the pollen grains of one parent, while the other half contain no starch.

Differences in the chromosomes in crossed races seem to determine the different types and combinations of characters which arise in the offspring. It thus appears that Mendelian differences in general have

originated as mutations, sudden and probably spontaneous germinal changes, possibly through an alteration in a portion or locus of a chromosome. That the differences which arise in this way are inherited as Mendelian factors results, then, from the manner of distribution of the chromosomes in the reduction divisions, when the nuclei of the germ cells are formed. Mutations seem to arise in the germ plasm at relatively infrequent intervals. They may be handed down to later generations for an indefinite period. In some cases the same mutation appears independently more than once.

The germ plasm of any human strain contains numerous recessive characters which may be transmitted for generations without appearing, until union with an individual carrying the same recessive character may ultimately bring it out in one-quarter of the offspring. The main features of a recessive character are that it disappears in the first generation of a cross between a pure dominant and a pure recessive, while it reappears in about one-quarter of the offspring of two individuals heterozygous for the character. It will appear in about half the offspring of matings between a heterozygous normal and a recessive.

In addition to inheritance of physical characteristics such as abnormalities, including colour blindness and haemophilia, which are sex-linked, and stature, eye and hair colour, inheritance of mental characteristics appears to be transmitted in much the same manner.

The evidence of inheritance of mental and moral traits in many cases seems sound and beyond dispute, although in the matter of human character it is less certain how far the accident of early environment may suppress or seriously modify the expression of various inherited traits. It is a region where the structural basis of the developed inheritance is so delicate, and the contact with the environment so intimate—character and environment becoming so mutually involved and interpenetrating—that it is conceivable that the laws applying to structural characters are not applicable with the same rigidity to the elements or methods of reaction that go to make what is called human character. The statistical results of Pearson published in 1904 indicate that for siblings (brothers and sisters) the intensity of resemblance is as great for mental as for physical traits. He chose eight physical characters, namely, health, eye colour, hair colour, curliness of hair, cephalic index, head length, auricular height, and athletic power; and eight "mental" characters, vivacity, assertiveness, introspection, popularity, conscientiousness, temper, ability, and handwriting. While many of these characters are not definite enough for anything like accurate measurement and therefore have no decisive value, yet the coefficient of correlation between brothers and sisters comes out 0.51 for physical and 0.52 for mental characters. Schuster and Elderton (1907) from a statistical survey of Oxford class lists attempted to determine the correlation in mental ability between father and son, and between brothers who attended the University. They found r (coefficient of correlation)=0.312 for father and son and r=0.405 for brothers. They agree with Pearson that mental and physical characters are inherited with the same intensity.

In 1919 Pearson considered the subject from different data comparing the results of applying the Binet-Simon test (a) to children in orphanages in California, hence under nearly uniform conditions; (b) to children

in schools in Great Britain, under the greatest variety of conditions of education and home training. Although the mental environment was relatively uniform in one set of data and diversified in the other, yet the correlation of intelligence between siblings was the same in both groups, the resemblance, r=0.508 in the Californian and r=0.515 in the English data, indicating that heredity and not environment determined the differences in all cases.

As clearly defined a scheme of inheritance cannot be laid down for mental as for physical characteristics. Since every individual may be supposed to be heterozygous for many pairs of traits of human character, it appears possible that mental traits generally differ from structural characters in that all the alternative possibilities may come into expression in the same individual at different times, thus adding to the complexity of the result. Human character in its developed form appears to consist in the acquired habit of inhibiting certain inherited tendencies and giving free expression to others. Differences in powers of inhibition are undoubtedly inherited, and weakness in such power may lead in the one extreme to vicious tendencies, and in the other to a free expression of the other elements of the inheritance.

Inheritance of ability has been greatly discussed and forms an extremely complex question. In types of ability where the correlated action of several independent qualities or factors is required, the appearance of the same combination of exceptional qualities in the offspring is very likely to be infrequent, because of the presence of alternative characters in the germ plasm.

While feeble-mindedness may result from accidents and certain diseases in childhood the great majority of cases appears to be hereditary. It is impossible to develop a mind beyond its inherited capacity. The mental development may stop at any point, and training cannot push it any further, although the most persistent efforts may be put forth in this direction. Once mental progress ceases, further development must be along manual lines.

From unions of feeble-minded parents it would seem that the condition is inherited in a definite way. With a normal mother retaining a recessive feeble-minded characteristic and a feeble-minded father the offspring are 50 per cent. normal and 50 per cent. deficient. When the father is heterozygous and the mother feeble-minded a greater proportion of the offspring seem to be feebleminded. When both are feebleminded practically all the children are feebleminded. This would appear to favour the interpretation of feeblemindedness as a simple recessive.

It is on account of findings such as these that theories have been advanced suggesting that eugenic action should be based upon four factors (1) positive selection for desirable qualities, which are frequently dominant, (2) negative selection against undesirable recessive qualities which appear in collateral or ancestral lines, and may therefore be carried in the family germ plasm, (3) isolation of individuals having undesirable dominant qualities, (4) correlated with this should be an effort to foster matings between individuals showing the same desirable recessive quality. While many theorists agree in this opinion it is generally concluded that sufficient data is not yet available to warrant the putting of their theories into practice.

# EXPECTORANTS

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It has long been known that certain substances facilitate expectoration, usually by making the bronchial secretion more fluid and thus more easily coughed up. Such bodies are termed expectorants. Many drugs act in this way and have from time to time been added to the Pharmacopoeia, some only later to be dropped, while others have justified their position and are largely used in the treatment of bronchial catarrh. The discovery and use of these have been almost entirely empirical and the experienced clinician, although he knows their value, often finds it hard to explain exactly how they act. The late Dr. Forchheimer well said, "Expectorants are often very disappointing and uncertain but I would be very sorry to do without them," and most practitioners will endorse this statement.

Pharmacology has as yet shed very little light upon the *modus operandi* of expectorants. It is well to remember that there is a profound difference between the action of these substances on a normal and on a diseased mucous membrane. While some drugs, such as potassium iodide and apomorphine, can be shown to increase the normal bronchial secretion, many of the best expectorants cannot be so endorsed; they act best or only when the mucous membrane is inflamed.

Theoretically, expectorants are supposed to bring about their effects in any of the following ways: (1) reflexly from the stomach. Most emetics cause, as a precursor or accompaniment of emesis, a pouring out of bronchial secretion and hence are expectorants, and when given in small doses may produce this effect without any vomiting or even nausea. Such substances are ipecacuanha, antimony, saponin, ammonium carbonate and squill. (2) Certain salts when absorbed from the alimentary tract are excreted by the bronchial mucous glands and there stimulate secretion. Various alkalies, ammonium chloride, potassium iodide, are all examples of these. (3) Various aromatic bodies are excreted by the respiratory tract and increase secretion there. They also act as mild antiseptics and hence are useful when there is any foetor in the secretion. Tolu, turpentine, creosote and camphor are examples of these. (4) Many substances when inhaled cause increased secretion. Moist air so acts as do also slightly irritating vapours as those of creosote, chlorine and ammonium chloride.

Although all drugs so far mentioned may increase bronchial secretion, when one comes to their therapeutic use it is found that there are certain differences between them which make some of value in acute catarrh and others in chronic disease. Ipecacuanha and ammonium carbonate are both supposed to act reflexly from the stomach and yet the former is soothing in acute bronchitis while the latter, if then given, may cause distress while it is helpful in chronic conditions. The skilful selection of the best expectorant in a given case is largely a matter of therapeutic acumen, but the following grouping may be of some service:

(1) Those expectorants found useful in acute catarrh, such as ipecacuanha, antimony, sodium bicarbonate and other alkalies, and salines, such as sodium chloride, ammonium chloride and potassium iodide.

(2) Those found of service in chronic catarrh. Such are squill, ammonium carbonate, senega, and, to a certain extent, also the members of the first group.

(3) Drugs having a stimulating and antiseptic effect upon the respiratory tract. Practically all substances containing aromatic principles belong to this class, of which examples are creosote, turpentine, terebene and tolu.

The members of the first of these three groups are often called depressing expectorants and those of the second stimulating. These qualifying adjectives do not refer to their action upon the bronchial mucous membrane but rather to that upon the general circulation. All the same, the stimulating ones are generally found to have an irritating action on the respiratory tract in that they cause distress when given in acute conditions. No doubt some of them are directly excreted by the bronchial glands and can thus cause irritation. Squill is believed by many to be so excreted and may then irritate, as it undoubtedly irritates the kidney. This local irritating action, while objectionable in acute catarrh, may be of value in the more chronic form, just as a certain degree of irritation may help in many chronic skin affections although contraindicated in acute ones.

In acute bronchial catarrh there are three stages: (1) engorgement of the mucous membrane, with irritative cough, substernal distress, and little or no secretion. (2) The stage of secretion. (3) The stage of drying up of secretion and return to normal. When the first stage is succeeded by the second the patient feels easier as the engorgement is lessened and the cough becomes productive. Expectorants are used to hurry on this second stage, and as soon as it is fully established their *raison d'être* ceases and they should be discontinued as they are all more or less apt to disturb the digestion. Part of the soothing effect of expectorants at this stage is no doubt due to the increase of secretion, which acts as a protective to the inflamed mucous lining.

In chronic catarrh the pathology is more complicated and various, but when the cough is unproductive expectorants often give considerable relief. Some of them, besides causing secretion, seem to lessen the relaxed state of the mucous membrane.

The treatment of bronchial catarrh includes far more than the use of expectorants, but it is only with this aspect of the therapy that we are here concerned. It is well to remember that a drug which acts as an expectorant may also have various other side effects which largely participate in the total results. Thus ipecacuanha and antimony are diaphoretics, squill has a digitalis-like action, the iodides are eliminative, and so on.

The following are examples of a few types of bronchial catarrh in which expectorants will give much relief.

Acute bronchitis, with fever, a dry unproductive cough and substernal oppression. Give inhalations from hot water, upon the surface

of which has been thrown some tincture of benzoin, or, better, tincture of tolu, and internally the following:

℞
*Vini Ipecacuanhae*
*Potass. Acetat.*
*Syrup. Tolu* aa ʒij
*Liq. Ammon. Acetat.* ad ʒvj
*M*

*Sig.* A tablespoonful in water every four hours.

The ipecacuanha wine may, with advantage, be replaced by a similar amount of *vinum antimoniale* in sthenic subjects.

A patient with chronic bronchitis, who has great difficulty in getting rid of a scanty sticky secretion, may be given the following with advantage:

℞
*Ammon. Carbonat.* ʒi
*Tinctur. Scillae* ʒij
*Syr. Prun. Virg.* ʒiij
*Aq. Chloroform.* *ad* ʒvi
*M.*

*Sig.* A tablespoonful in water thrice daily after meals.

Or instead, he may have small doses (2½ grs.) of potassium iodide or 10 to 15 grains of ammonium chloride thrice daily.

Often in very chronic cases of bronchial catarrh the chief difficulty is in the morning when some sticky secretion which has accumulated during sleep cannot be dislodged without great effort, the paroxysms of coughing even going on to emesis. Here much comfort can be given by letting him drink on waking a glass of hot water in which has been put the following:

℞
*Sod. Bicarbonat.* ʒss
*Sod. Chlorid.* ʒi
*Spirit. Chloroform.* ʒij
*Aq. Anisi* *ad* ʒvj
*M.*

*Sig.* A tablespoonful in a glass of hot water on waking.

When in any case of bronchitis there is a tendency to foetor in the expectoration the aromatics are indicated. These substances may also with advantagebe inhaled. For the latter purpose equal parts of creosote and spirit of chloroform dropped on an inhaler which is worn for hours at a time is useful. Internally any of the aromatic expectorants may be used. One of the best is guaiacol carbonate in doses of 5 to 10 grains severaltimes daily. The odour soon appears in the breath.

Lastly, one may mention the value of strychnine in chronic bronchitis. It is in no way an expectorant unless one includes, as some do, any substance which aids in expectoration. It stimulates the respiratory centre and increases the efficiency of the cough and thus enables the patient to get rid of much secretion which may be threatening to smother him. For this purpose it should be given in large doses, say, 1/20 grain three times a day.

# DIATHERMY

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Medical electricity is a subject of great controversy, particularly in Canada at the present time. We are close neighbours to a nation of enthusiasts, and unfortunately so much has been published in the United States during recent years, extolling as cure-alls the various forms of electro-therapy, that the result has been to turn many members of the medical profession in this country against methods that they feel must be largely quackery. The attitude very generally seems to be that medical electricity is "a lot of little sparks and lights," chiefly used by osteopaths, chiropractors and others of that ilk, and best left to them. Nevertheless, during the past ten months, that form of treatment known as diathermy has so greatly increased in use at the Toronto General Hospital that a brief description of it and a few of the conditions for which it is being used there, may be of interest.

The current used in this work is a "high frequency current," which has a very high amperage and relatively rather low voltage. The property of this current is its inability to stimulate the excitable tissues or to cause electrolytic changes. The machine is so constructed that oscillations of current are produced, numbering not less than 500,000 per second, and this number of alternations is sufficiently high to eliminate any ionic movement. The effect is entirely thermal, the heat being *formed* deep in the tissues.

Different methods of application are used for various conditions. In treating a joint, two metal plates or cuffs of a suitable size, are applied on either side of the affected area. These are first coated with a heavy soap lather to soften the skin, which, in its dry state, presents a rather high resistance to electrical currents. In placing the electrodes, perfect contact with the limb is the first essential. Any crease or air space will cause the current to collect at that point, with consequent sparking followed by a blister or even a burn. The electrodes are connected to the machine by heavy conducting cords, and the current turned on gradually. A meter registers in milliamperes the amount of current which is being delivered, and this is determined by the size of the electrodes, the resistance of the part under treatment, and the comfort of the patient. The point of greatest heat is midway between the electrodes when they are of equal size.

## *Chronic Conditions*

Of conditions treated in Toronto, the greatest number have been chronic osteo-arthritics. These patients come to us with the typical dull ache in knees, shoulders, sacro-iliac joints, etc. Treatment is given three times a week, and as most of them are cases of years standing, no miracle is performed; but if the treatment is faithfully carried out, improvement becomes apparent after five or six applications, and from that time relief from pain and increasing range of movement follow in a large percentage of the subjects. In cases of chronic synovitis, old dislocations, etc., where effusion has organized, and in fractures just

out of plaster, diathermy is an invaluable adjunct to massage, as it increases the blood flow through the part, and hastens the absorption of exudate. Many of the painful stiff fingers following industrial accidents or septic conditions of the hand, can be manipulated without too great discomfort after half an hour of diathermy.

Chronic unhealed lesions, such as old varicose ulcers, X-ray burns and results of radium reaction have responded very well to diathermy. In the first condition this treatment alone has resulted in complete healing over of several quite intractable cases. In the two latter conditions diathermy has been used in conjunction with the ultra-violet lamp and has certainly hastened recovery.

*Acute Conditions*

The early cases which we have so far had the opportunity to treat have been more limited, but sprains, bruises, etc., are often sent in the day after the injury has occurred, and have cleared up very rapidly. At the end of the first treatment the patient usually finds that any acute pain is gone, and that movements in the joint are much easier. Daily treatments for a week are usually sufficient for complete recovery.

Another early case which responded very well was a badly infected hand which came to us two days after operation for drainage, with the tubes still in place. The tips of the fingers were placed in a bowl of saline, with a metal plate also in the water, and a metal cuff around the wrist. At first during the treatments an increased quantity of pus came away, and the pain was lessened. When the tubes were removed the incisions healed rapidly, and at the end of four weeks from the operation the man had a good hand with almost complete movement in all joints.

During the past three months every alternate pneumonia case admitted has been treated by diathermy. Two large plates, 7 x 5 inches, are placed on the back and front of the chest over the affected area, and from one to two thousand milliamperes of current passed for twenty-five minutes. The great difficulty in this work is the fact that in a General Hospital many of the pneumonia cases are only admitted days after the beginning of the disease. Several of the series have been moribund when we began treatment, and for these late cases little or nothing can be hoped for from diathermy, but in a few cases admitted on the second or third day, results have been quite good, the temperature falling by lysis, starting from the first application.

The series is as yet far too small to speak of results. Whether or not these will justify diathermy taking a regular place in the treatment of pneumonia remains to be seen, but in any case, the patients for the most part like it—it makes them more comfortable and it in no way interferes with the existing routine.

The condition in which we have had least success with diathermy is Neuritis. Although it is advocated in many text-books, none of the patients treated here have obtained relief by this means, and in every case we have resorted to other physio-therapeutic measures before improvement was felt.

The two contraindications for diathermy are:

1. The presence of pus without drainage.
2. The risk of haemorrhage.

This, therefore, leaves a large field for its use.

Diathermy is one of the simplest forms of medical electricity. It is neither alarming nor mysterious in its application and result. As compared with other forms of heat, such as local baths (both water and hot air) and radiant heat and light, it possesses two individual advantages. First, there is no erythema or discomfort from long periods of diathermy, such as is experienced by many people with delicate skins, following prolonged treatment by radiant heat and light.

Secondly, instead of distributing the heat over the superficial parts, diathermy, when intelligently applied, delivers the heat at the exact point where it is needed.

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## PARA-SMALLPOX

Dr. R. P. Garrow, medical Officer of Health in Chesterfield, England, describes in the *Lancet* for January 31st, 1925, a new disease entity resembling smallpox, and which he calls "Para-smallpox." He believes it to be the same disease as that known in South Africa as Amaas and in South America as Alaster. He bases his description on 500 cases occurring in the borough of Chesterfield between October, 1923, and July, 1924.

He describes the disease briefly in the words of a layman-patient as "pimples following influenza." The onset is gradual with headache, dizziness, aches and pains, shivering, nausea, vomiting and sore throat. Many of these symptoms may be absent. They indicate a toxaemia, and the patient thinks his condition is "'flu." The eruption is frequently delayed till the patient has entirely recovered, strikingly differentiating the disease from smallpox in which the eruption appears about the third day of the illness. The eruption has a distribution like that of smallpox, but the lesions are smaller, more superficial and resemble amber beads in the final stage. Secondary fever is rare with the eruption. There is no prodromal rash. The only complications observed were connected with the eyes, and were blepharitis, conjunctivitis, ulceration of cornea, keratitis profunda.

The mortality is nil.

Vaccination for smallpox appears to protect against para-smallpox, but Dr. Garrow does not think there is any relation between these diseases, nor between chicken-pox and para-smallpox.

Dr. Garrow gives very interesting reasons for his belief that the type of a disease does not change, *i.e.*, that a mild form, for instance, of smallpox cannot become severe. For these reasons he believes that the Amaas of South Africa is not a mild form of smallpox, though considered there to be so. Nor does he believe that the mild form of smallpox prevalent in Detroit had any relation to the severe epidemic in Windsor in 1924.

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# EYE CONDITIONS IN PREGNANCY*

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The ophthalmological findings of pathological obstetrical cases during the past two years' experience at the Burnside may be of help to those handling obstetrical cases.

The findings varied from hysterical blindness to total blindness, optic neuritis, detachment of the retina, thrombosis of retinal vessels, retinal hemorrhages. All were found.

There may be some difference of opinion as to the classification of the various toxemias, but in order to have at least a working basis on which to pin the various fundus findings, I will give what apparently is recognized as a fair division of this subject leaving out the term eclampsia as at present it practically covers the very severe forms of toxemia and is not treated as a separate entity. I will deal with the three great types:

(1) Acute Toxemias of Pregnancy.
(2) Chronic Nephritis.
(3) Recurrent Toxemia of Pregnancy.

(1) *The Acute Toxemias of Pregnancy*

These form a rather definite clinical entity. This form is more common in primiparas, usually occurring in the latter months of pregnancy. The onset is rather sudden, generally there are premonitory symptoms as headaches, malaise, spots before the eyes and transitory loss of vision, followed by convulsive seizures. The urine is scanty and may boil solid with albumin. Labour usually occurs spontaneously and if the patient survives, the urine becomes normal in a short time, and subsequent pregnancy may take place without fear of a recurrence of the toxemia.

Cases going to autopsy show hemorrhagic liver changes with thrombosis and necrosis, also cerebral hemorrhages. The kidney changes are similar to the liver changes and not at all like the nephritic type. Another interesting point is that the secondary kidney damage (for this is not a primary kidney lesion) may be severe enough to cause permanent changes, so that in succeeding pregnancies the patient may have a true nephritis. The treatment in general is to empty the uterus more quickly in these cases than you would in the cases of chronic nephritis in which the chance of sudden convulsions would perhaps be less, but, of course, all cases are judged on their merits and everything is considered before terminating the pregnancy.

(2) *Chronic Nephritis.*

This includes patients who before pregnancy had, unknown to themselves, chronic nephritis and the extra burden of pregnancy caused the process to become severe. The onset is gradual, appearing usually in the second half of pregnancy. The symptoms are more or less those of

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chronic nephritis. The urine does not contain as much albumin as in the acute toxemias but has more casts, and if convulsions supervene, the urinary picture will be that of an acute toxic nephritis.

From a practical point of view these cases must be handled differently to the acute toxemic cases, for following the pregnancy the blood pressure remains up, the urine has albumin and casts, and succeeding pregnancies will be sure to have toxic symptoms and increased kidney and ocular changes.

As Williams has pointed out, these cases are apt to have premature infants either dead at birth or shortly after. The placenta shows infarcts as a rule in such cases. The chances for having a healthy baby, if the case is at all severe, are relatively poor. It is usually safer to carry these cases along farther than the acute toxemias as there are usually more warning symptoms before convulsions set in.

(3) *Recurrent Toxemia of Pregnancy*

These have been more recently described by Foster Kellogg as the recurrent toxemias of pregnancy. This type has urinary changes, high blood pressure, etc., in succeeding pregnancies but between pregnancies in contra-distinction to the chronic nephritic cases are absolutely normal. Some of these cases, if carefully handled, can go through pregnancy successfully. Whether this group is a distinct entity or whether these patients should be classed as persons who have not enough kidney function or reserve to stand the extra load of pregnancy is open to discussion, some feeling that this should be a subdivision of the cases of nephritis.

*Danger of Permanent Visual Damage*

Serious impairment of vision or blindness is a large price to pay for a baby that is quite apt to be dead. (Burnier reports an infant mortality of 79 per cent. in women showing extensive fundus changes.) The reality of danger to the mother is well illustrated in the following:

Burnier reports 44 per cent. of the women with retinitis as being blind or having greatly reduced vision, the mortality being 13 per cent. In Silex's series, *only 65 per cent.* of the patients with retinitis *had sufficient vision to permit reading.* Rochon-Duvigneaud's statistics showed 28 per cent. with normal vision, 58 per cent. with definite visual damage, and 14 per cent. blind. In Schiotz series of forty cases, 14 patients had normal vision, 18 had diminished vision and 1 was blind. The onset of fundus changes may be insidious with practically no subjective symptoms yet extensive damage occur before the macular region is involved and central vision practically obliterated. If one waits till the patient complains of greatly damaged vision, one is taking unwarranted chances for cases of retinitis have been reported with negative urinary findings. Practically what it amounts to is that if a *toxemic patient shows a retinitis fairly early in pregnancy, you can be reasonably sure that she will have very badly damaged vision if she is allowed to continue the pregnancy and does not abort spontaneously.* If the retinitis comes on in the last week or so, the prognosis is better and the fundi will probably clear up after delivery; but even in these cases the fundi and vision should be carefully checked up and labour induced if necessary. Therefore, the following conclusion seems logical, namely, if a toxemic patient shows a retinitis, the chances are four to one that she has nephritis, and should be care-

fully followed up for over a year, not being placed in the acute toxemic class and allowed to become pregnant again, unless urine, blood pressure, etc., were absolutely normal during this year. The immediate prognosis for life of patients showing retinitis is bad in many cases. If properly handled, the nephritic patient may live for years, but in the long run the prognosis is poor. If the retinitis persists for a considerable period, post partum, the prognosis is naturally worse.

*Treatment of Patients with Retinitis*

There is, of course, no absolute criterion, and every case should be judged on its own merits; but, in general, *if the retinitis is discovered at any time previous to the last two weeks or so of the pregnancy, the pregnancy should be terminated.*

Most of the women having marked hypertension show a narrowing and tortuosity of the arteries with slightly increased brilliance of the light streak. This is especially marked in the smaller arteries, around the disc, and in the macula. In short, if seen in a person of 60 years or more, these changes might be classed as "normal for age." In young adults in whom they are found they are distinctly abnormal and are, I feel, due to a functional vaso-constriction. The hypertension is the essential factor, and it makes no difference whether the cases are of acute toxemia or nephritis.

As a rule, the retinitis of the acute toxemia of pregnancy is an acute toxic rather than a vascular affair. Fundus changes vary from oedema of the retina, hemorrhagic retinitis to complete separation of the retina. In the nephritic cases the vascular changes predominate, namely, tortuosity or narrowing of the vessels with hemorrhagic or white spots, due to former hemorrhages, and the typical albuminuric retinitis picture is present. This is due to a chronic process antedating pregnancy. Thus, theoretically, it should be easy to differentiate between the acute toxemia and the chronic nephritis by the fundus picture alone; but, practically it cannot be done in the majority of cases for the following reason: If the pre-existing chronic nephritis was not severe enough to cause vascular changes, as is often the case, the sudden flaring up of the nephritis caused by the extra burden of pregnancy will show *more the acute toxic type of fundus picture*, and the chronic vascular changes will not be found. In the rare cases in which the vascular changes are found, however, by the fundus picture alone, one can make a definite diagnosis of chronic nephritis, and according to Greenwood, the probable life of the patient will not exceed two or three years. At the risk of repetition, it should be remembered that if retinitis is present there is a four to one chance that the patient has nephritis.

The routine examination of the fundi is of distinct value to the obstetrician. It has been asserted that, if properly handled, cases of toxemia should not be allowed to progress to the point at which extensive fundus changes appear, and the fundus changes are, without doubt, found only in the extreme cases. In toxic cases where the question of terminating the pregnancy is in doubt the fundus findings can frequently be the deciding factor.

# A FEW POINTS ON THE GENERAL DIAGNOSIS OF SKIN DISEASES

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It is important for the student or practitioner wishing to acquire a knowledge of skin disease to be impressed with the fact that many are intimately connected with the domain of medicine and surgery, and that their study requires that they be considered, not in a narrow, special sense, but in a broad way and more or less intimately connected with pathology and medicine. To-day it is almost universally admitted that a great many skin diseases are associated with internal diseases and, indeed, many of them are but an expression given on the surface of those diseases. The skin is frequently the seat of irritation and inflammation; and when one considers its structure, its situation, the conditions which surround it and act upon it, it is readily seen how exposed this organ is to disease and, varied as are the eruptions due to external irritation, yet many others are aetiologically related to visceral diseases, gastro-intestinal disturbances and, even hereditary or acquired conditions.

Certain articles of food are found to be the cause of skin disease and many drugs having a variety of actions and uses are frequently found to produce the most varied dermal lesions. A large group of diseases of the skin are the result of the action on it of microscopic vegetable parasites and a similarly large group follows on invasion by animal parasites. During the past few years fungus diseases have been more or less epidemic and a considerable percentage of our cases have been due to these vegetable or fungus infections. Sometimes diseases appear as the result of some morbid condition inherent in the structure of the skin itself often associated with external irritation or infection with some one or other of these vegetable or animal parasites or pus forming organisms.

It is difficult sometimes to arrive at a definite aetiological cause for many of the inflammations which one thinks are definitely due to some form of external irritation, but it seems best to always eliminate a possible external cause first and then the way is opened for inquiry and a search for some internal cause.

One's success in diagnosis depends largely on a more or less broad knowledge of medicine, powers of observation and retentiveness of memory of dermal affections. In these cases one must call to service a knowledge of physiology and pathology of the circulation, of reaction of the nervous system upon the skin and of infections both local and general. Climatic conditions are often an important factor and so also age and sex as well as various foods and variations of race and finally conditions resulting from heredity.

Certain general rules should be followed in the examination of skin cases. The build of the patient, his habits, and medical history often are of interest. Frequently much information can be gained from his occupation as this very often exerts a local or general influence upon him. Then the eruption should be studied and for this a good light is required—preferably daylight—and the site, extent and intensity of the

eruption must be considered and whether it is the first attack or a recurrence. It is always advisable to examine all of the eruption; in the case of women, however, a considerable amount of tact is necessary in order to do this, and such an examination can usually be proceeded with without shocking the most sensitive patient.

The objective signs are those lesions visible to the eye and are of two types—Primary and Secondary—and all skin lesions are composed of one or both of these types. It is necessary, therefore, to know these lesions as they form the basis of diagnosis. Some eruptions which look simple consist of one primary type of lesion with occasional secondary lesions resulting from it; others consist of more varied types of primary lesions and their secondary changes. Observation of these lesions is important from the standpoint of the situation, evolution, tendency to be grouped or be sparsely scattered and their mode of disappearance as well as any peculiarities of their secondary changes. Sometimes an examination of the newer or more recent lesions gives more information than the older lesions.

The primary lesions are as follows:

1. The erythematous spot.
2. The papule.
3. The tubercule.
4. The vesicle.
5. The pustule.
6. The bleb.
7. The wheal.
8. The tumour.

The secondary lesions are:

1. The excoriation.
2. The fissure.
3. The scale.
4. The crust.
5. The ulcer.
6. The scar.
7. The pigmented spot

The subjective symptoms are those such as fever, malaise, debility or nervous disturbances, in other words, the constitutional symptoms and those referable to the skin itself, anasthesia, hyperaesthenia, itching, burning, a sense of crawling or pricking of pins. In some diseases these symptoms are all absent, in many others exaggerated.

Lesions of the skin may be limited to a small portion of any given area or areas or may involve the entire body. They may be evenly and symetrically located or be limited to one side. They very frequently follow the lines and furrows of the skin or the lines of the ribs and along or near the course of the cutaneous nerves. Because of these groupings they present various forms and outlines; at times circular—in the form of rings—or parts of circles or even a series of parts of circles, and at times in wavy lines.

Many diseases of the skin show a predilection to develop on certain parts, and this is so constant that a splendid text-book has been written called *Regional Dermatology*, taking up diseases of the skin by their location rather than the usual way of dealing with them in aetiological groupings. One finds that the erythematous eruptions are apt to occur about the backs of the hands and the sides of the neck. The eczemas about the flexor surfaces where the skin is fine and thin. The lesions of psoriasis about the extensor surfaces and about the joints where the skin is thick. Acne about the face and shoulders where there are large sebaceous glands. One finds the vegetable parasitic diseases in the groin, between the toes or fingers, where heat and moisture are present, or in the hairy regions, such as the scalp, beard and axillae.

The colours of many diseases are more or less regular and definite, from the brilliant red of scarlet fever and the deeper brilliant red of erythema multiforme to the violaceous hue of lichen planus. The colour of syphilides varying from the early rose shade rash to the later papular types which are distinctly ham-coloured. We see the yellowish colour of tinea versicolor or the salmon tint of pityriasis rosea or the bright red spot of purpura, not disappearing on pressure and gradually changing and becoming yellowish.

With most of the diseases of the skin some conspicuous feature may be picked out either as to duration, location, type of lesion, colour, odour, or some peculiar objective or subjective sign that gives one a hint to the diagnosis and in most instances a correct diagnosis is usually a hint to a successful form of treatment.

## FACULTY NOTES

**Hockey** The Senior Meds.' Hockey team, last year's cup winners, were defeated only after two final games had been played, overtime being required.

**Assault-at-Arms** In the interfaculty assault-at-arms, Meds. were successful, against strong competition, in carrying off the Davidson Cup.

**Daffydil Night** Those who were so unfortunate as to fail to see this year's Daffydil performances missed a rare treat indeed. Such an extravaganza of drama and melodrama, comedy and histrionic art, fun and caricature was worth going miles to see. One notices with favour an increased tendency to deal with topics of general rather than purely medical interest. We believe the entertainment was better this year than ever. The cup goes for the third consecutive time to the class of '26, who retain it permanently.

**Basketball and Baseball** In basketball and indoor baseball Meds. are very much in the running, and prospects are quite bright for seeing at least one cup to adorn the Secretary's office during the coming year.

# PHYSICIANS!

When you begin practice you are reminded that the Provincial Board of Health, Department of Health, Province of Ontario, supplies free of charge the following biological and other products used in the prevention and cure of disease:

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(7) Phenarsenamine (606) and Mercury salicylate.

The foregoing as well as containers for blood, sputum, etc., may be obtained on application to any of the Board's Laboratories at Toronto, London, Ottawa, North Bay, Fort William, Owen Sound, Peterborough, Kingston, Sault Ste. Marie.

Further information supplied on application to

CHIEF OFFICER OF HEALTH,
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